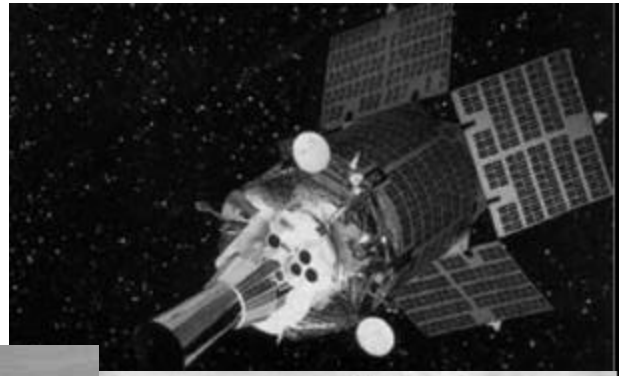
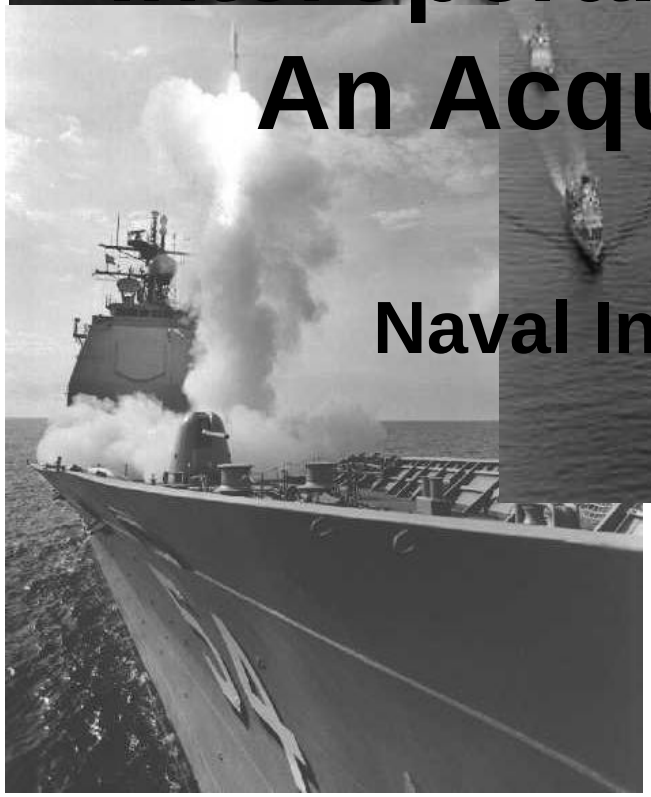
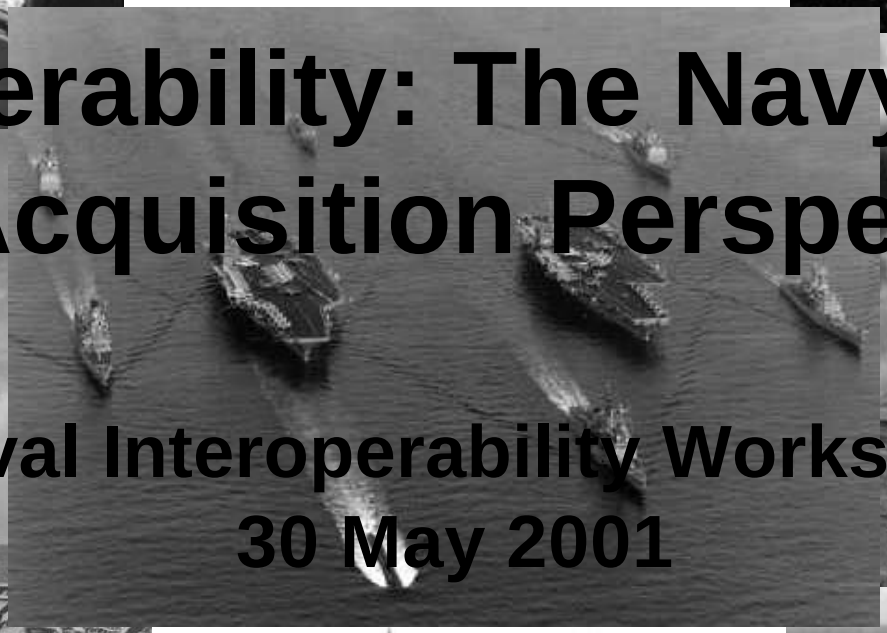


ASN (RDA)
CHIEF ENGINEER

Interoperability: The Navy View - An Acquisition Perspective





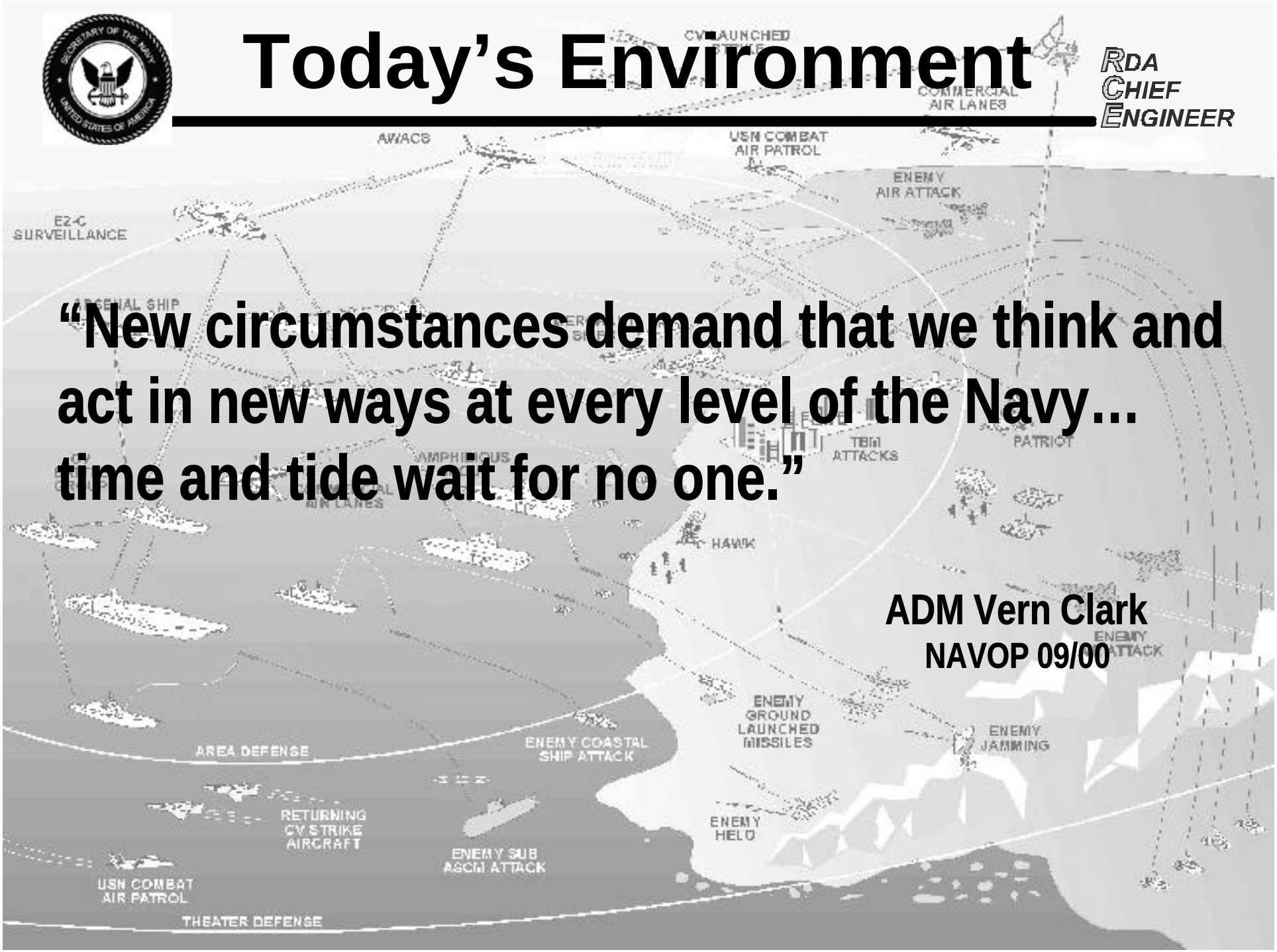
Naval Interoperability Workshop
30 May 2001

Unclassified

RADM Kate Paige
RDA CHENG

Today's Environment

RDA
CHIEF
ENGINEER



"New circumstances demand that we think and act in new ways at every level of the Navy… time and tide wait for no one."

ADM Vern Clark
NAVOP 09/00

Nothing New Under the Sun

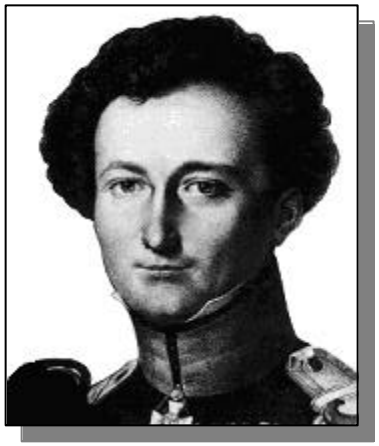
RD&A CHIEF ENGINEER

"… in war, more than in any other subject we must begin by looking at the nature of the whole; for here more than elsewhere the part and the whole must always be thought of together."

-- Carl von Clausewitz

On War

(1832)



The World is Changing

RD&A CHIEF ENGINEER

SENSE OF URGENCY

From	To
Independent Program Focused System Engineering Efforts	Force Level System Engineering
Independent Program Management	Coordinated Program Management
Stovepipe Program Development	Multi-Program Development
Stand Alone Program Test & Analysis	Integrated Test & Analysis
Ad Hoc Fleet Involvement	Integrated Fleet Involvement

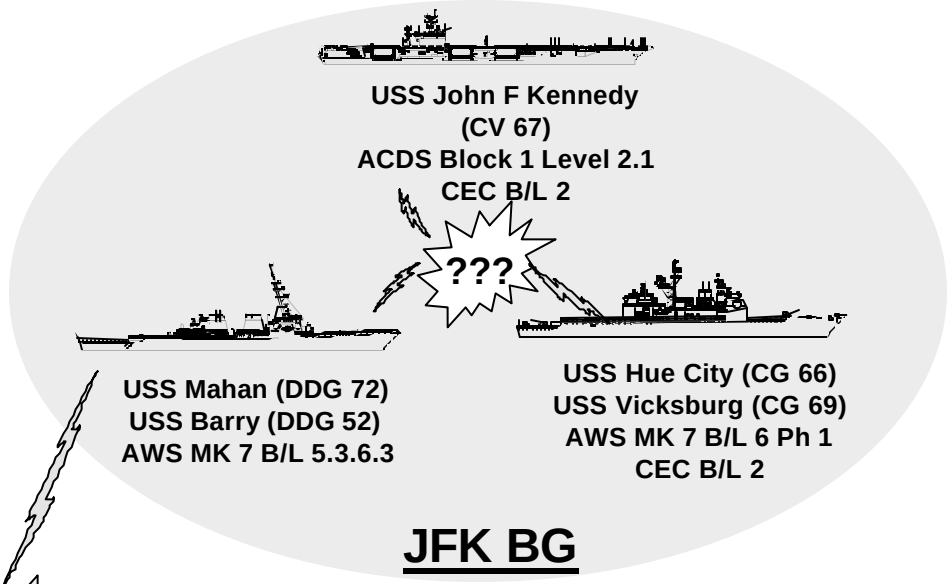
Without Abandoning the Rigor of Engineering the Fighting Unit

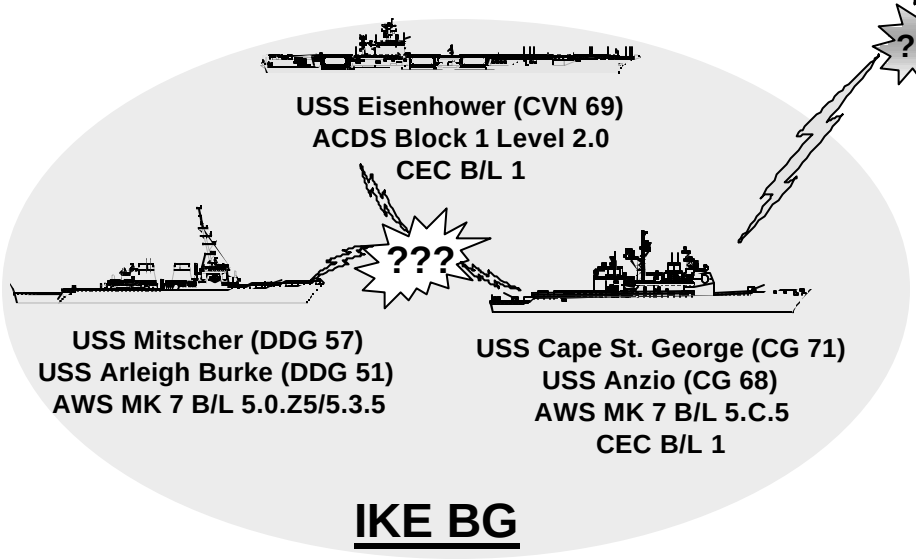
Navy Battlegroup Operations: 1997-1998

RD&A CHIEF ENGINEER

CNO WASHINGTON DC 021648Z MAY 98

"The introduction of increasingly complex warfighting capabilities into the fleet has resulted in significant battle group interoperability challenges."

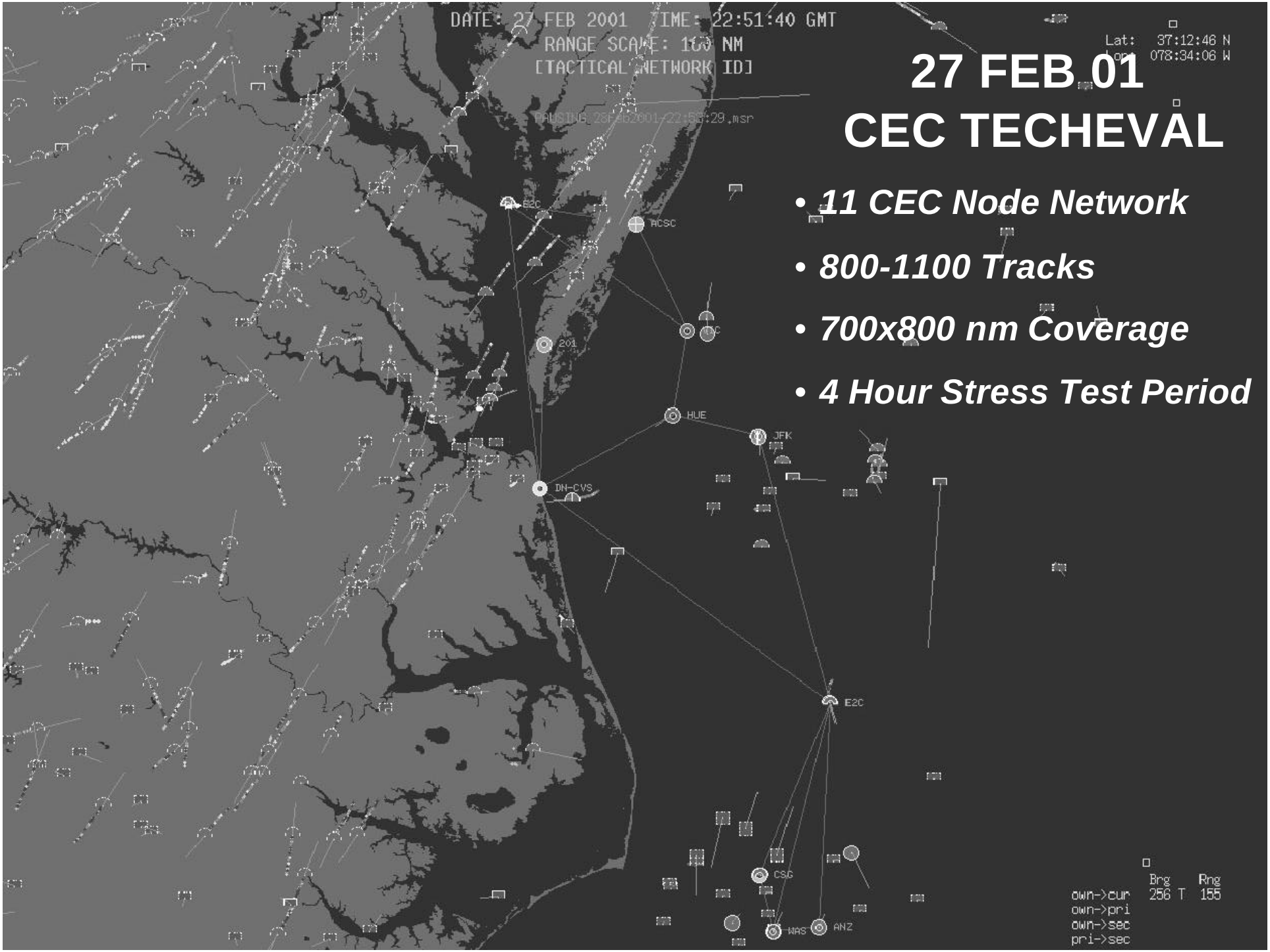




CINCLANTFLT BGSIT 021731ZMAR98

BGSIT Hot Wash-Up Message

" This report highlights the complexity of BG system architecture, lack of systems successful integration and failure of critical equipment. ***<u>In combination, the factors created an incoherent tactical picture for BG operators.</u>***"



27 FEB 01
CEC TECHEVAL

- *11 CEC Node Network*
- *800-1100 Tracks*
- *700x800 nm Coverage*
- *4 Hour Stress Test Period*

CEC TECHEVAL: Link Interoperability

RD&A CHIEF ENGINEER

- **CEC Battle Group Operated in a Demanding Link Environment:**
  - **Participants**
    - **Eight Surface Units**
      - **Four Different Combat Systems**
        - Both Model 5 and Model 4
        - USG 1 & 2
    - **Group II E-2C**
    - **Both CEC Equipped NP-3C and A125 E-2C**
      - **USG 3**
    - **Two Land Based Test Sites**
  - **High Track Loads**
    - **Over 1000 tracks provided via airborne CEC units**

The Navy's Organizational Response

RD&A CHIEF ENGINEER

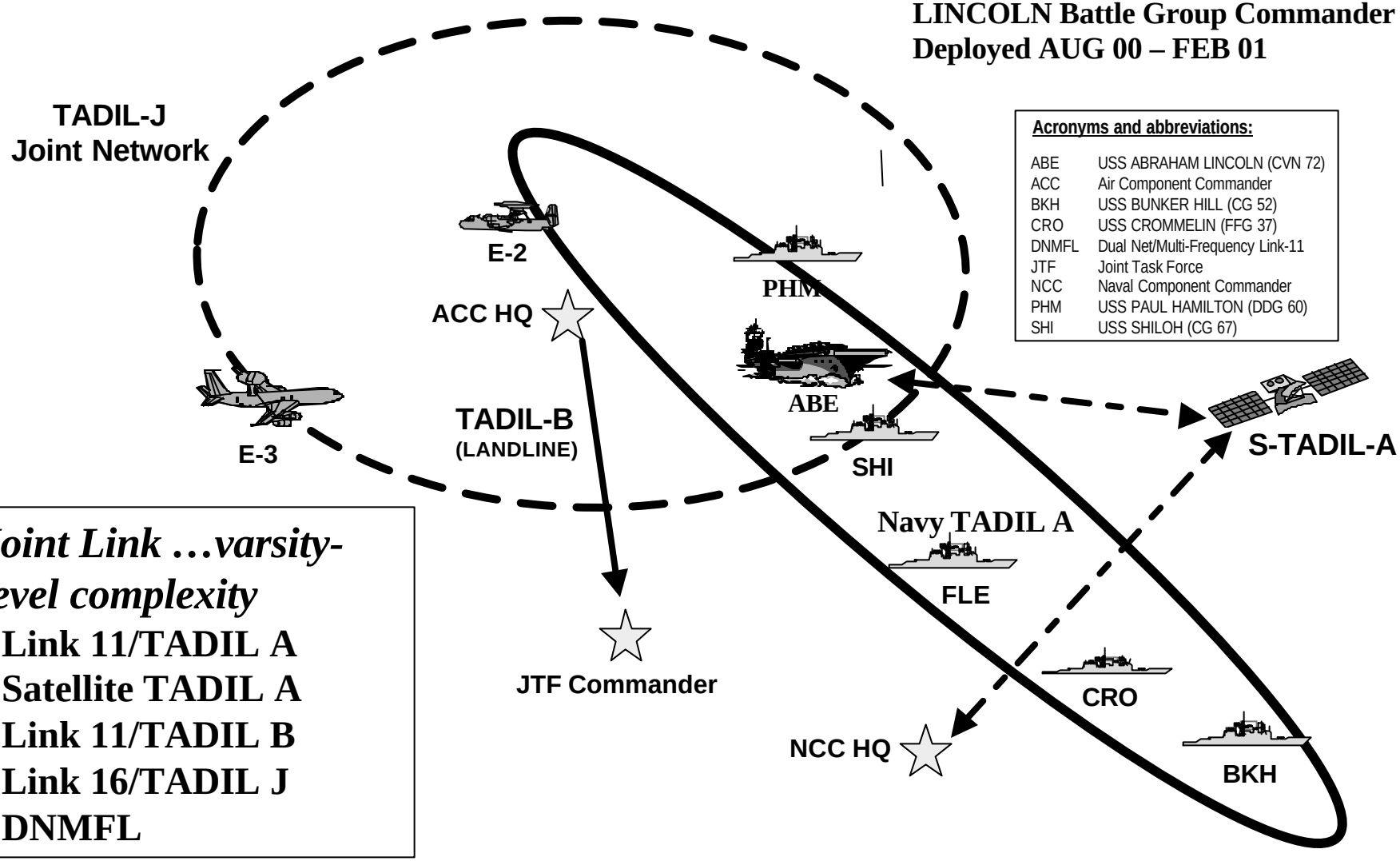
- PEO (Theater Air Defense) & PEO (AEGIS / Surface Combatants) Merged into Single PEO for Theater Surface Combatants - April 98
- CNO Designated NAVSEA (SEA 05) as CNO Lead for Battle Force Interoperability - May 98
- OPNAV Initiates Integrated Warfare Architectures (IWAR) Process
- ASN(RDA) Designates Chief Engineer as Senior Technical Authority Within the DoN Acquisition Structure
- OPNAV Reorganization: N8 → N7, N8, ACNO (MD)
- Joint SIAP SE Organization Established With Navy as Lead

Battle Group Link Operations

RD&A CHIEF ENGINEER

"We Are Making Progress With Interoperability"

RADM Phil Balisle
LINCOLN Battle Group Commander
Deployed AUG 00 – FEB 01



Acronyms and abbreviations:

ABE	USS ABRAHAM LINCOLN (CVN 72)
ACC	Air Component Commander
BKH	USS BUNKER HILL (CG 52)
CRO	USS CROMMELIN (FFG 37)
DNMFL	Dual Net/Multi-Frequency Link-11
JTF	Joint Task Force
NCC	Naval Component Commander
PHM	USS PAUL HAMILTON (DDG 60)
SHI	USS SHILOH (CG 67)

Joint Link …varsity-level complexity

- **Link 11/TADIL A**
- **Satellite TADIL A**
- **Link 11/TADIL B**
- **Link 16/TADIL J**
- **DNMFL**

The Challenge

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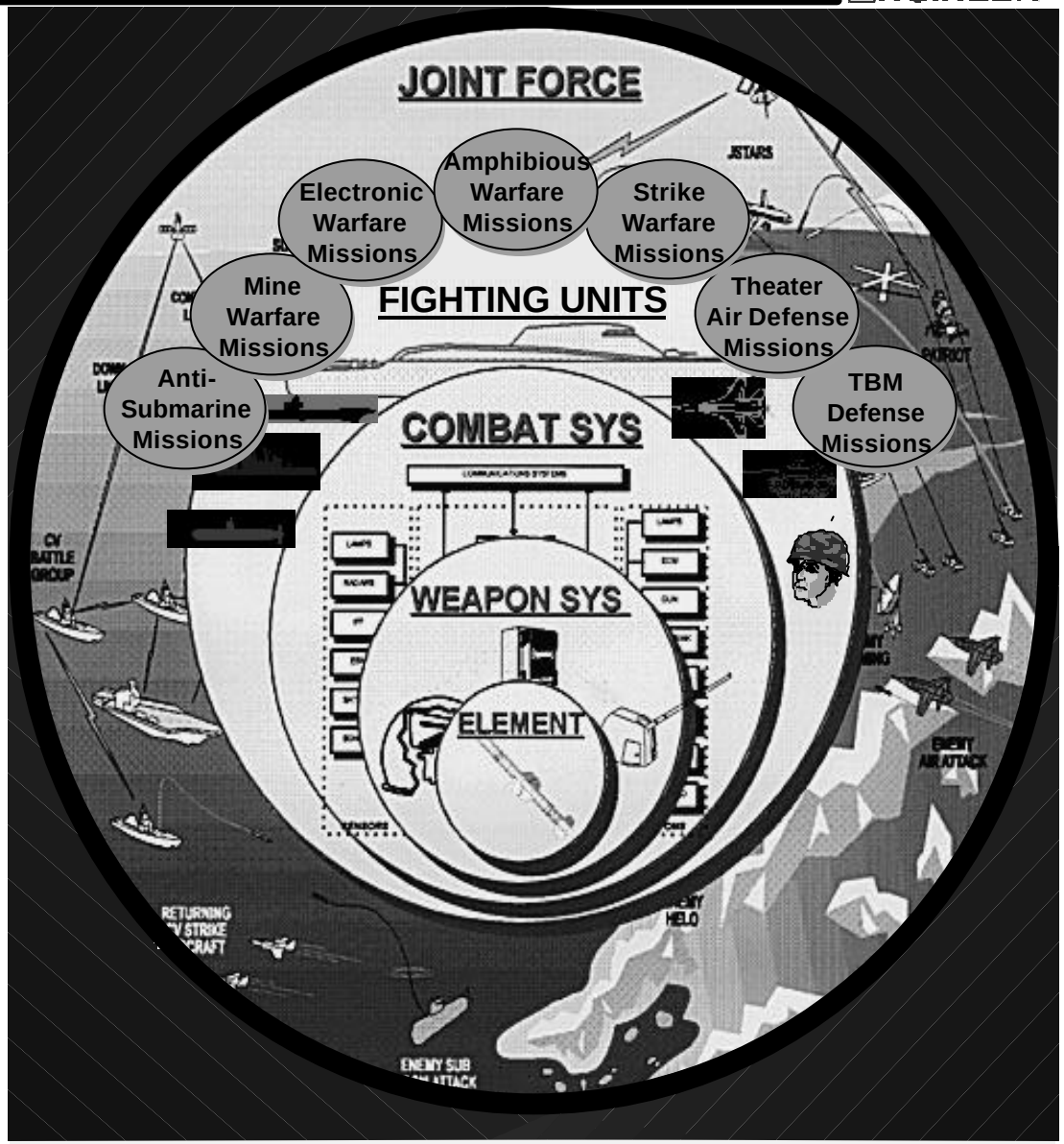
Systems Engineering & Management

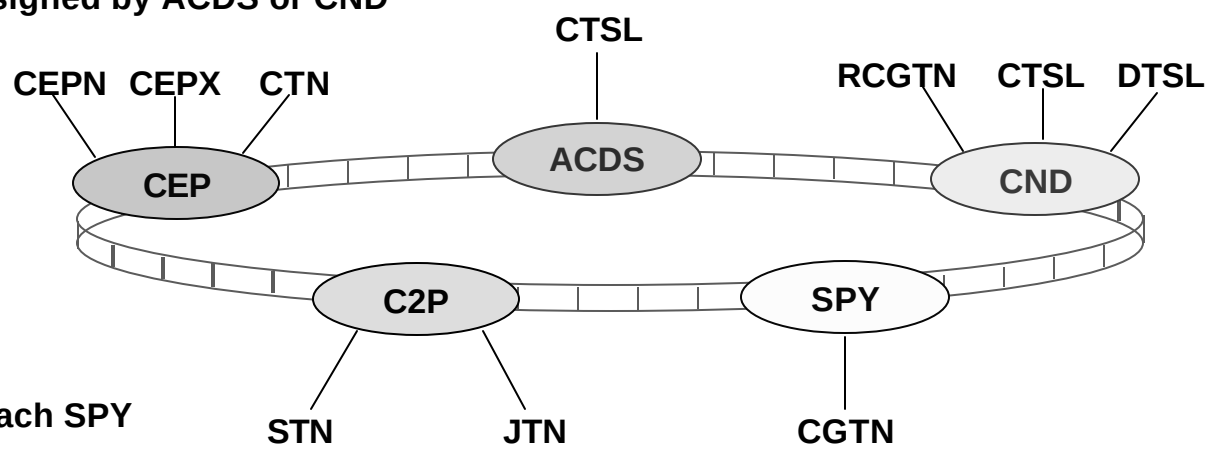
At All Levels



Track Number Management, Please

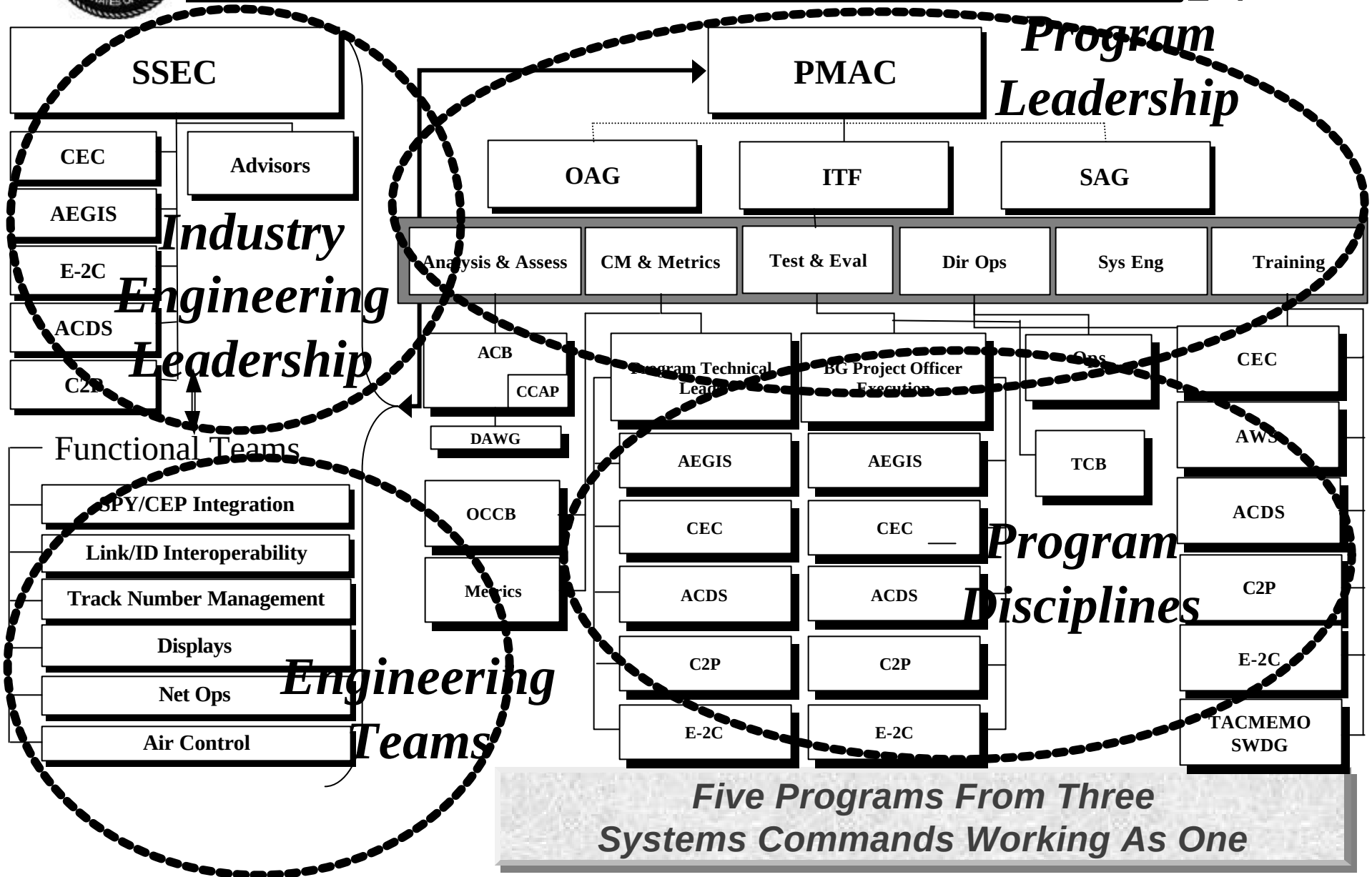
RD&A CHIEF ENGINEER

- **STN/JTN**
  - TADIL index used by all link units, assigned by R2 unit (C2P)
- **CTSL**
  - local combat system index, assigned by ACDS or CND
- **CEPN**
  - CEC index used by all CUs, assigned by originating CEP
- **CEPX**
  - local CEP index, assigned by each CEP
- **CGTN**
  - local SPY index, assigned by each SPY
- **CTN**
  - CEP local radar track index, assigned by each CEP adaptive function (SPY, 48, 49, IFF)
- **DTSL**
  - local CND Adjunct index
- **RCGTN**
  - local SPY reserved CGTN, index used for remote SPY measurements and special acquisition, assigned by each CND



A System of Systems Success Story
The Road to CEC OPEVAL

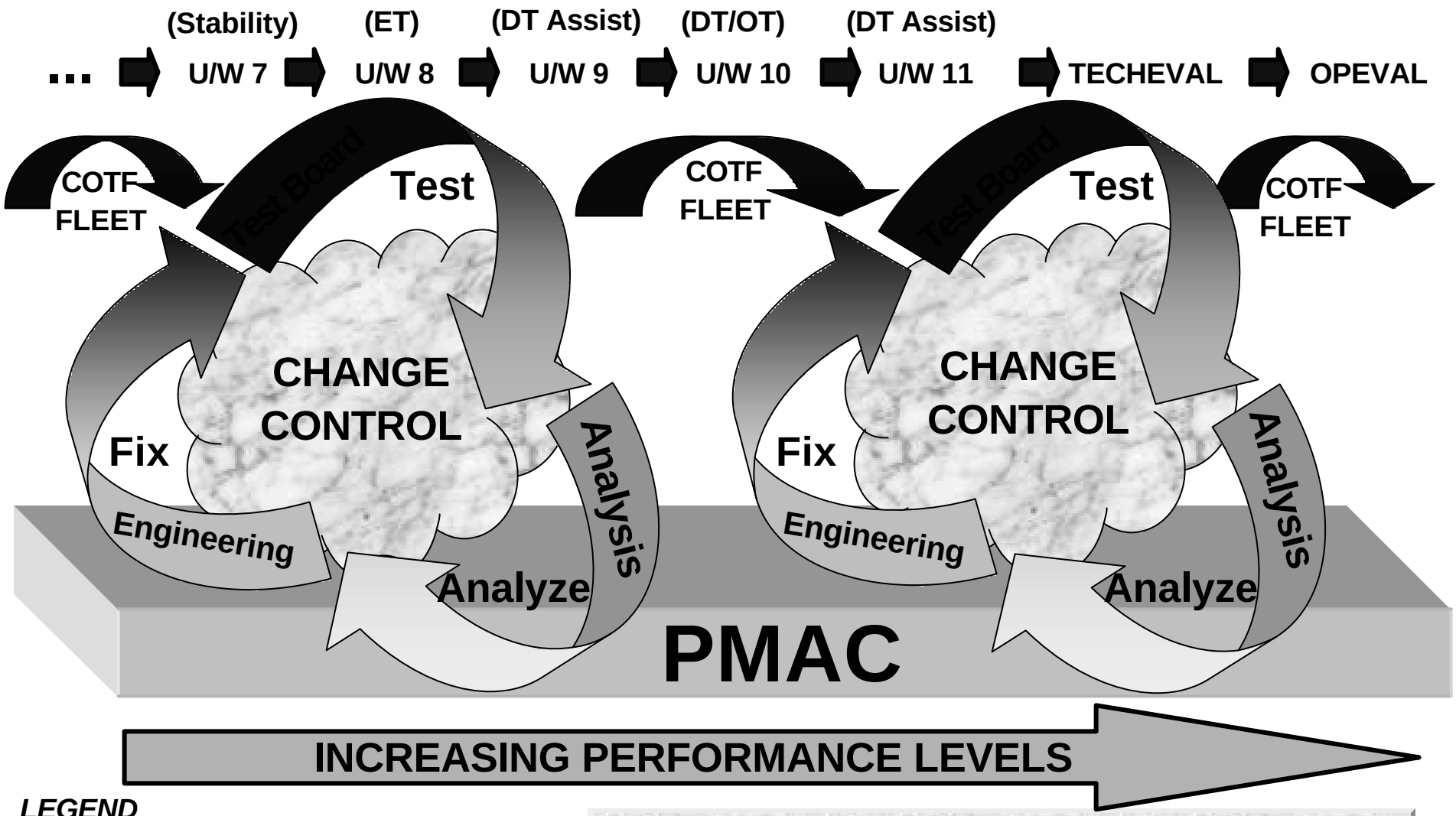
RD&A CHIEF ENGINEER



Five Programs From Three Systems Commands Working As One

Interoperability Task Force: Test - Analyze/Assess - Fix

RD&A CHIEF ENGINEER



LEGEND

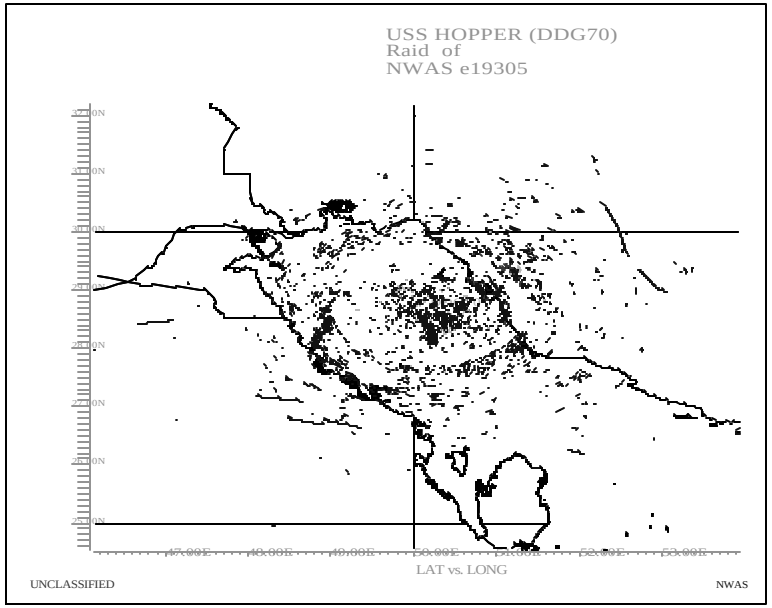
PMAC - Program Managers Advisory Council
COTF - Commander Operational Test & Evaluation Force

Test - Analyze/Assess - Fix

AEGIS DEA Improvement Program

RD&A CHIEF ENGINEER

- **Goal:**
  - **Improve Radar Performance in the Littoral**
    - **Reduce False DEA Identification**
    - **Reduce Track Maintenance Resource Requirements**
    - **Improve Track Continuity for Clear and DEA Targets**



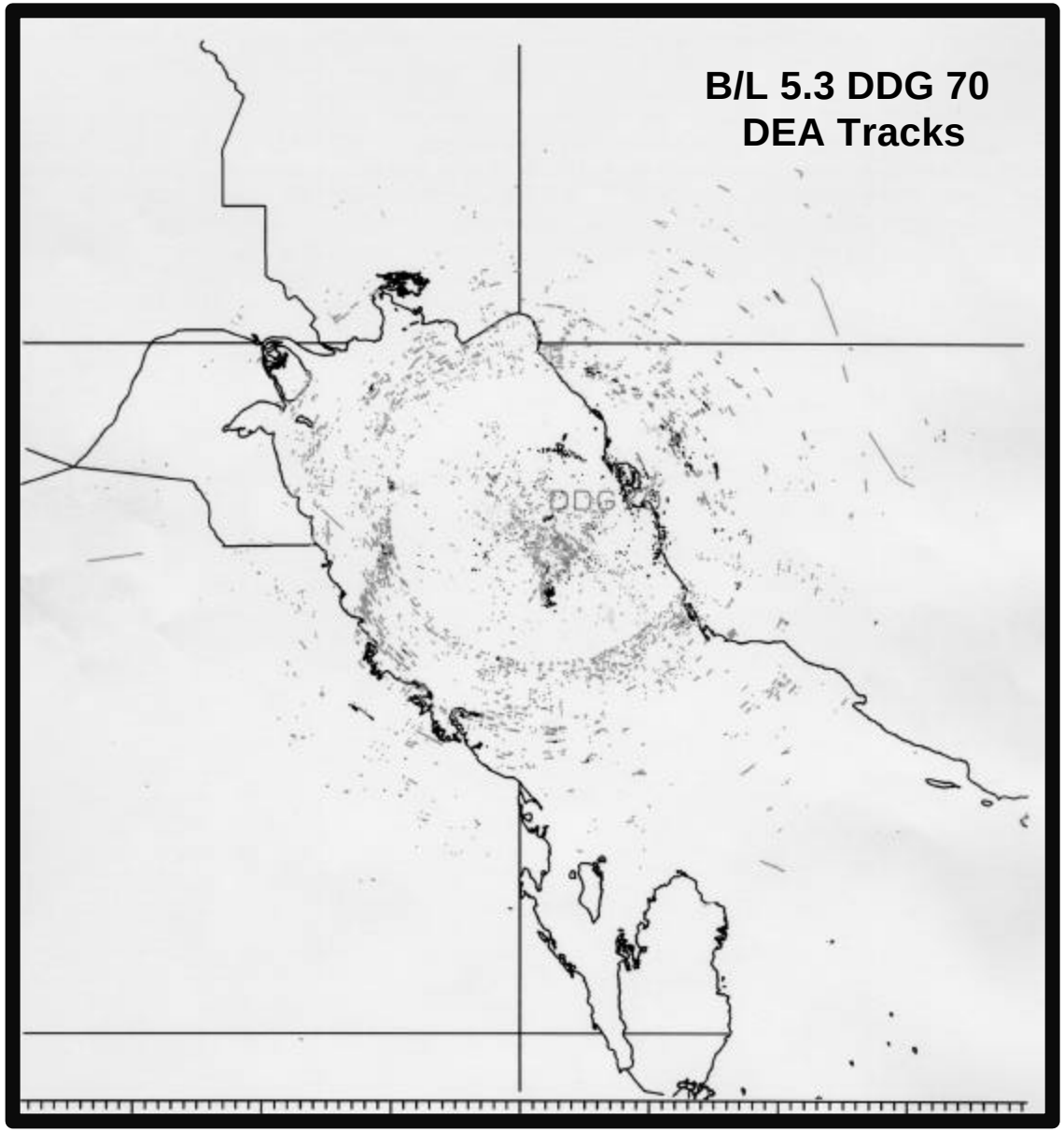
By Redesigning:

- **DEA Identification and Maintenance**
- **Track Steal Avoidance Logic**
- **Acceleration Sensing**
- **Track Filtering**
- **Track Association and Gating**

Interoperability is More Than a Data Link Issue

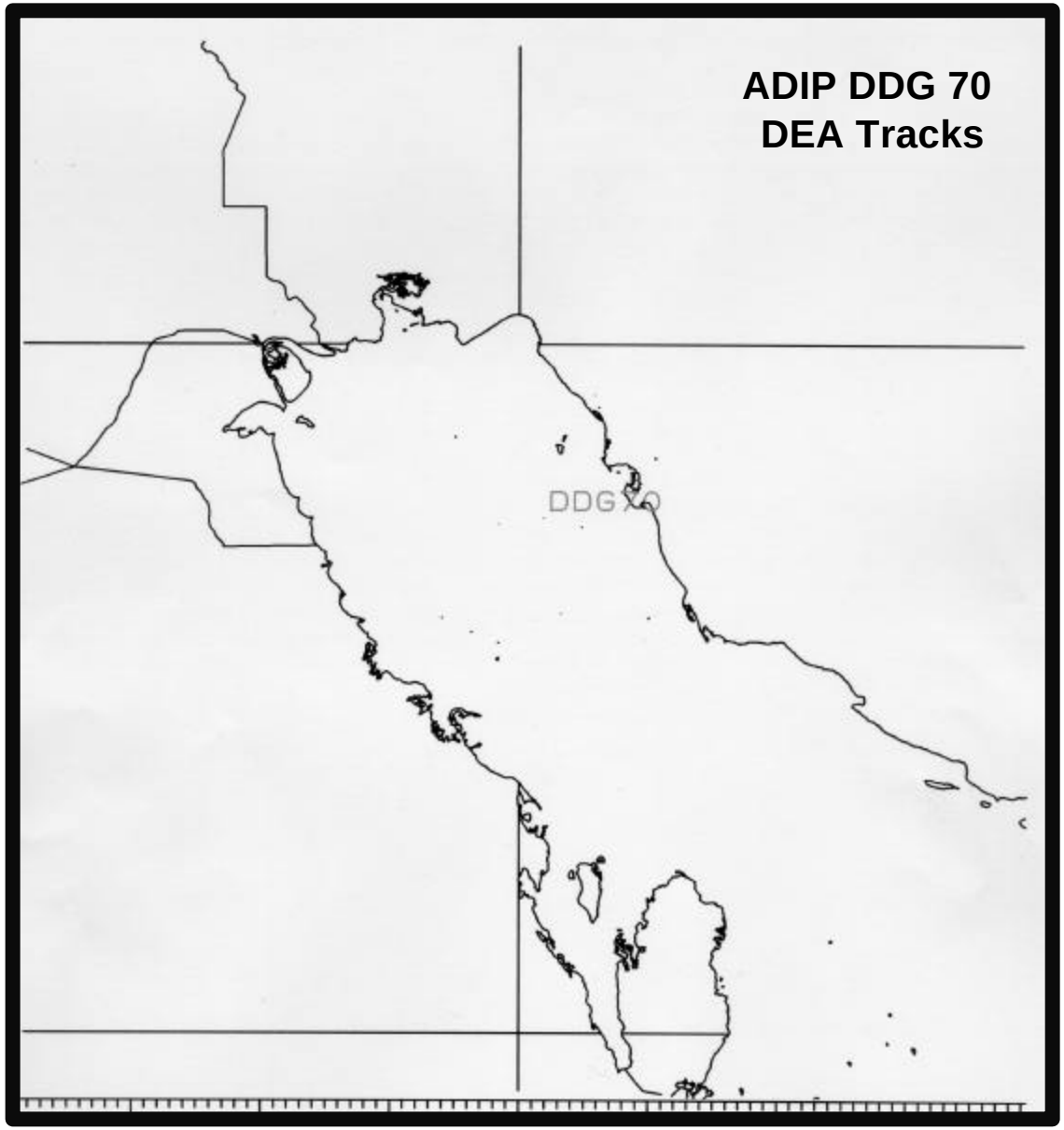
AEGIS DEA Improvement Program
Command and Control Results - June/July 2000

RD&A CHIEF ENGINEER



AEGIS DEA Improvement Program
Command and Control Results - June/July 2000

RD&A CHIEF ENGINEER



CC&D Warfighting Benefits

RD&A CHIEF ENGINEER

Improved Interoperability…

- Completeness
- Clarity
- Accuracy
- Continuity
- Commonality

Both of
• Information
And
• Action

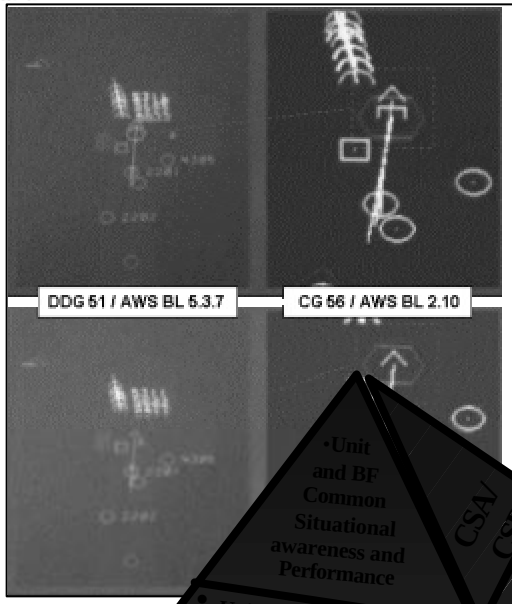
Warfighting Benefits

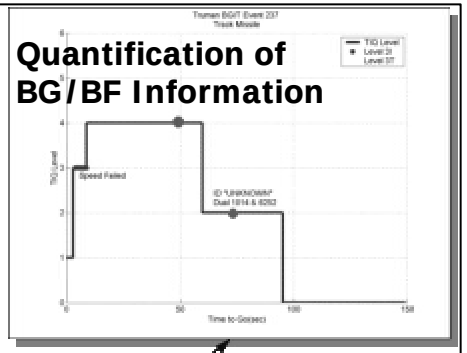
Increased Ability To Utilize Available Sensor And Weapon Assets

- **Shared coherent and correct situation awareness**
- **Reduction in decision reaction time**
- **Increased decision effectiveness**
- **Collaboration among units … sharing of assets**

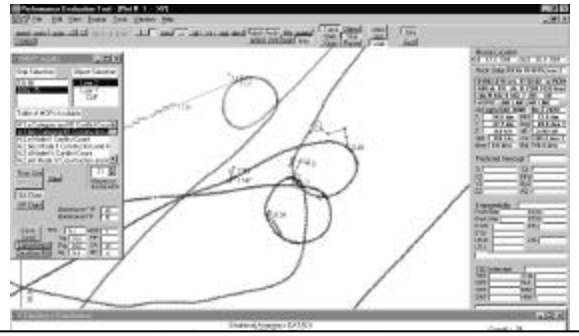
Analytical Tools – Essential to Progress

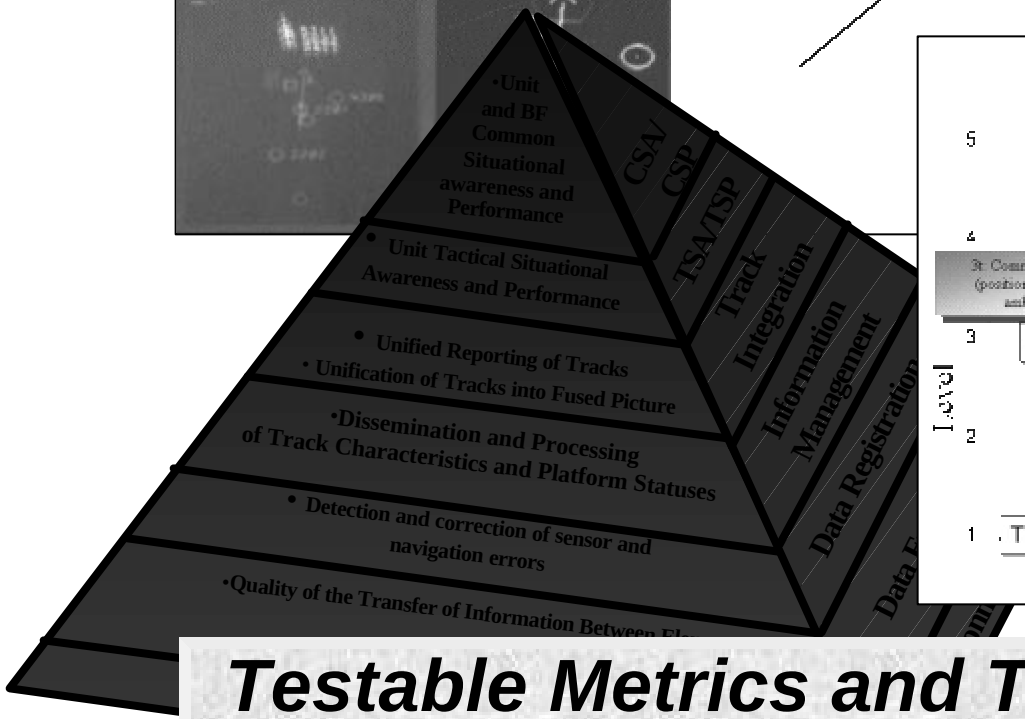
RD&A CHIEF ENGINEER

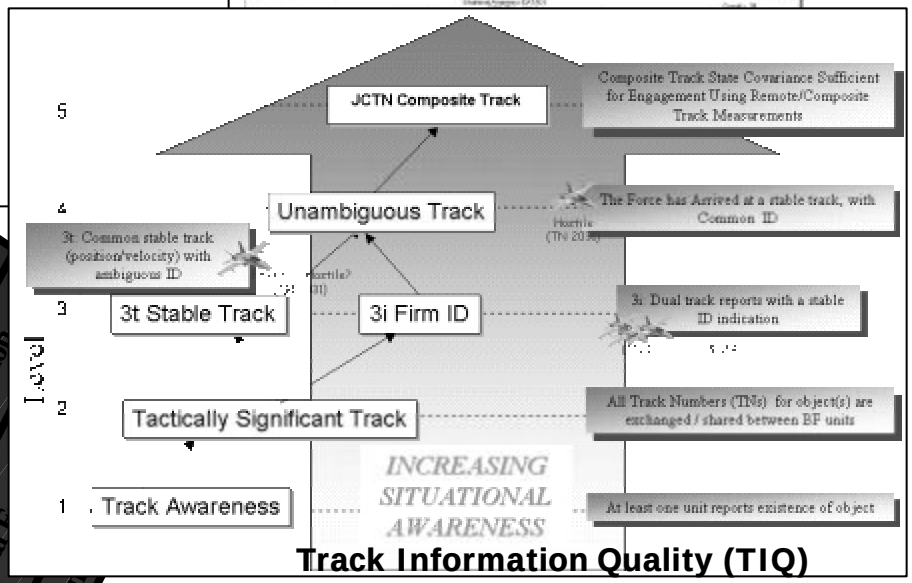




Performance Evaluation Tool (PET)







Track Information Quality (TIQ)

Testable Metrics and Tool Requirements Extracted from Requirements Trace

NAVSEA 53
Roles and Responsibilities

RD&A CHIEF ENGINEER

CNO DIRECTION:

- COMNAVSEASYSCOM is assigned central responsibility to address BMC4I/Combat Systems interoperability problems within the SYSCOMS/PEOs, and to coordinate resolution with the fleet. (CNO RMG 021648Z May 98)
  - Develop policy and architecture for BF Warfare Systems Engineering Process
  - Implement a common Warfare Systems Engineering Process
  - Provide top level direction for fielding and support of balanced combat systems in shipboard submissions
  - Develop and implement, with OPNAV and FLTCINCs, an improved battle group interoperability management process

COMNAVSEA RESPONSE:

- Assigned single office with responsibility for implementation/execution of Battle Force Interoperability (SEA 53)
- Designated Battle Force Systems Engineer (SEA 007)
- Issued guidance and policy paper 98-03, with FLTCINC concurrence, as interim guidance

SEA 53 Products & Processes Supporting Interoperability Today

RD&A CHIEF ENGINEER

- **Tools, Process and People in Place**
  - **Navy Distributed Engineering Plant (DEP)**
  - **D-30 Certification Process**
  - **Battle Force Action Officer/Fleet Liaison Program**

- **Responsive to CNO/Fleet Requirements**
  - **Joint CLF/CPF Instruction 4720.3A (D-30 policy)**
  - **CPF RMG 251912Z May 00 (adapts FDNF to D-30)**

- **Shifted Interoperability Focus From Ship-Centric to Battle Group-Centric**

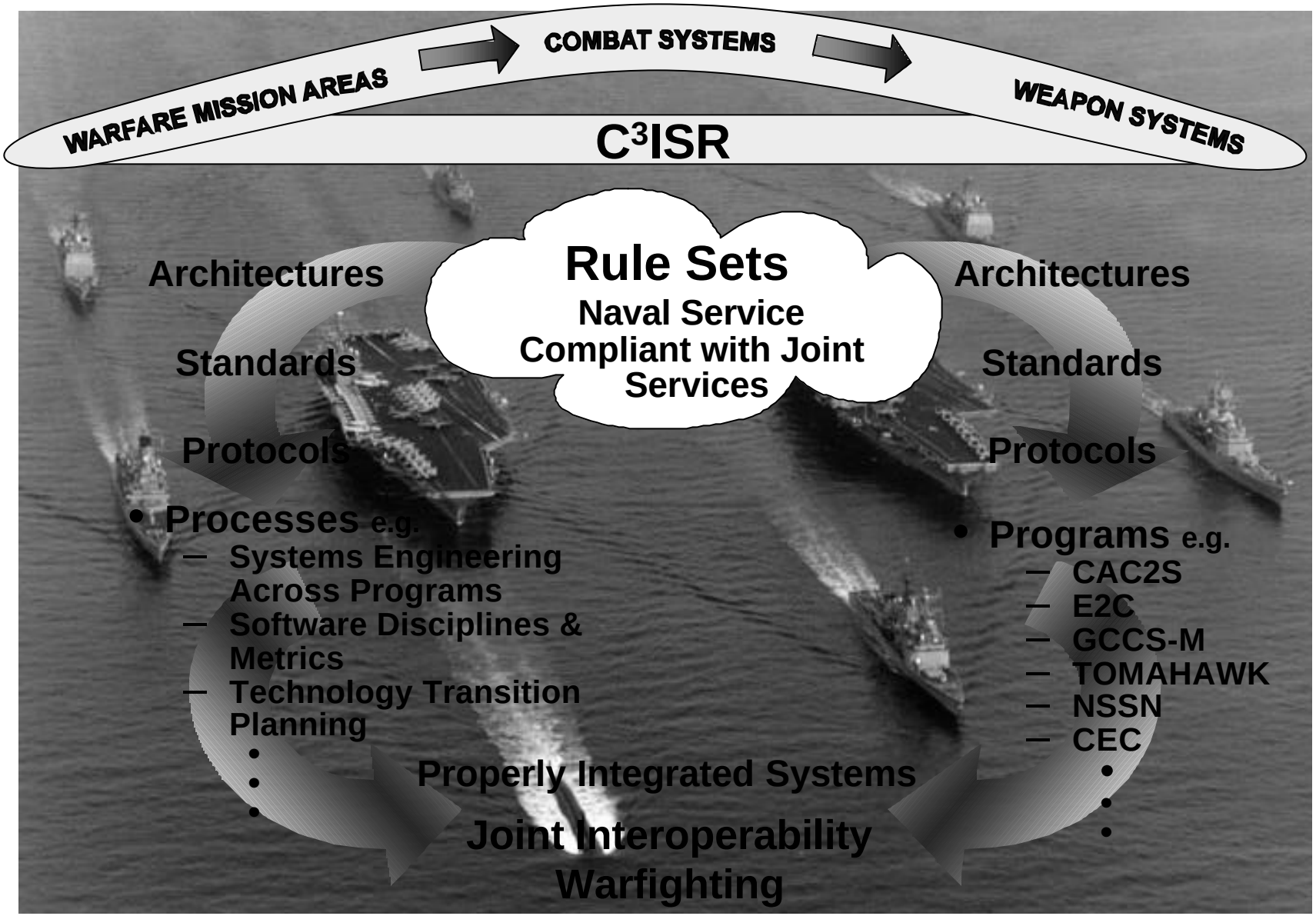
- **Moved Interoperability Testing Ashore**

- **Credibility established - CINPACFLT RMG 300229Z Aug 00**

A Disciplined Systems Engineering Approach Is In Place, and Is Maturing

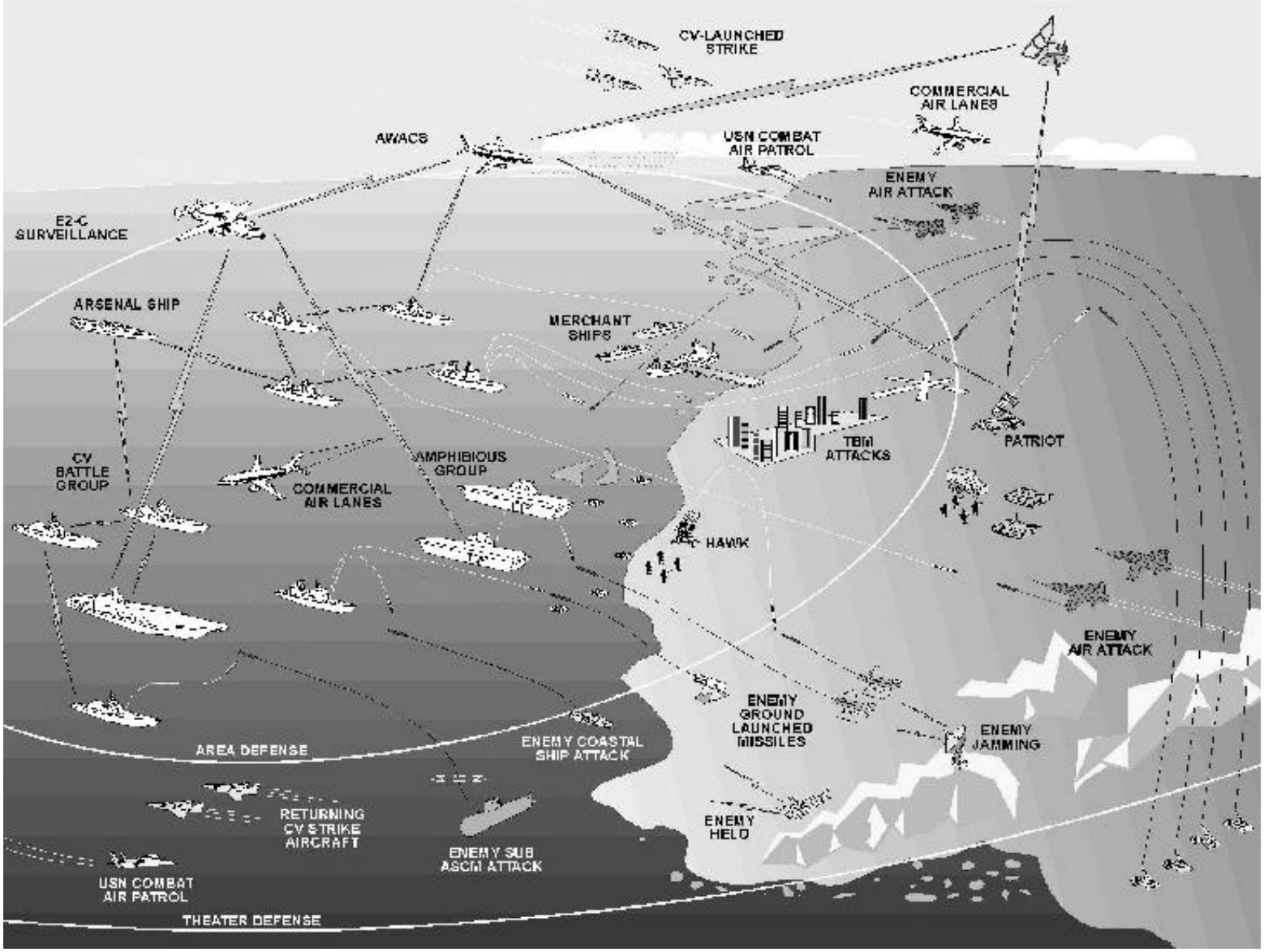
RDA CHENG Philosophy

RD&A CHIEF ENGINEER



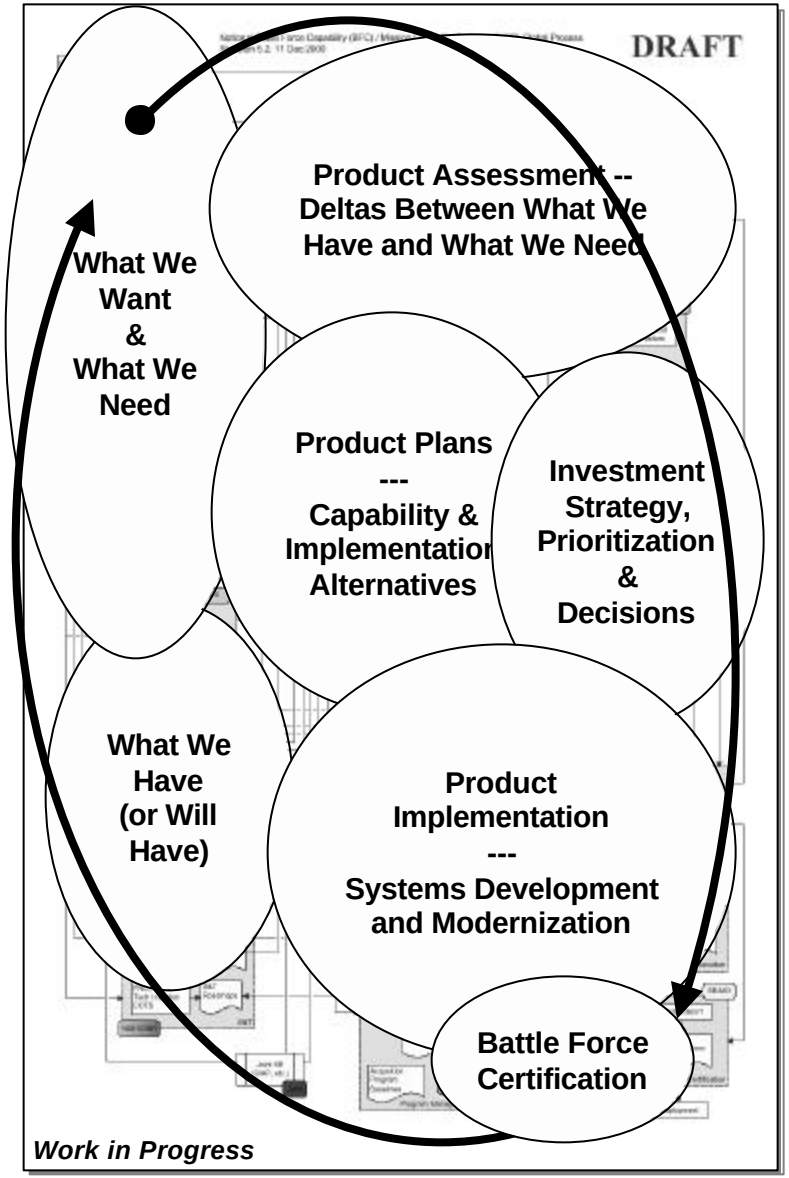
SIAP: An Operational Imperative

RD&A CHIEF ENGINEER



BFC/MCP Global Process

RD&A CHIEF ENGINEER



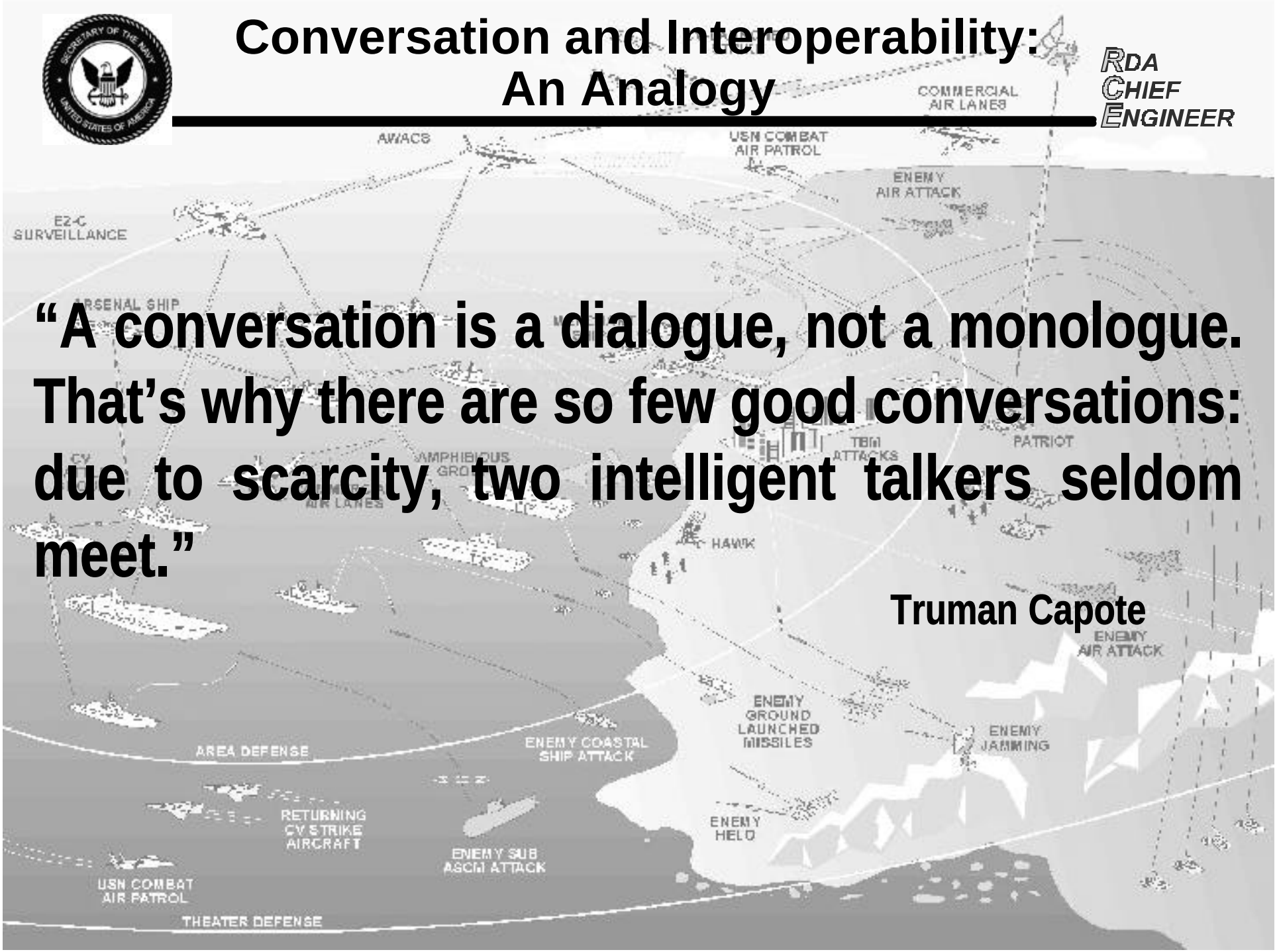
Changes to the status quo:

- Requirements integration
- Integrated capability architectures
  - Linked to service/joint strategy
  - Approved at highest levels
  - Linked to Navy's PPBS process
- Integrates the DoD decision support systems
  - Requirements generation
  - PPBS
  - Acquisition management

A Unified Work in Progress Among OPNAV, SEA 53, RDA CHENG, SIAP SE

Conversation and Interoperability: An Analogy

RDA
CHIEF
ENGINEER



"A conversation is a dialogue, not a monologue. That's why there are so few good conversations: due to scarcity, two intelligent talkers seldom meet."

Truman Capote

Conclusion

RD&A CHIEF ENGINEER

- **Lessons Learned Implementation**
  - **Organizational change (structural/behavioral)**
  - **Developmental speed and agility achieved through adherence to fundamentals**
  - **Clearly identified and defined system boundaries**
  - **Disciplined system engineering**
  - **Clearly documented and articulated interoperability requirements**
  - **Visible and meaningful involvement of the operator… for interoperability… More is better**
- **Interoperability is a Priority Issue**

From "Fire Fighting" to "Fire Prevention!"